Concept for a Spaceborne Ocean Salinity Mission using a Deployable Filled-Aperture Antenna

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Abstract
A mission concept is proposed that can provide near-all-weather, global measurements of ocean surface salinity. Additional information on surface temperature and wind speed can also be obtained using this concept. The concept employs an innovative new-technology design, consisting of a 6-meter-diameter, mesh-deployable, conically-scanning antenna, with multiple radiometer and radar channels in the 1 to 14 GHz range. This system can make observations with the high beam efficiency and calibration accuracy and stability required for salinity sensing, at a spatial resolution of approximately 50 km, from a 600-km orbit. The multichannel, constant-incidence-angle capability will enable corrections to be made to the salinity retrievals for the effects of surface temperature, surface roughness, and Faraday rotation. The effects of other perturbing influences such as solar radiation, atmospheric attenuation, and galactic emission have also been studied. Simulations show that salinity retrieval accuracies of 0.2-0.3 psu or better, at 100 km and bi-weekly space and time scales, appear feasible, and could be improved upon with careful assimilation of in-situ and model information with the satellite data.